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(54) **Band strapping device**

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EP 0 890 510 B1

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Description

[0001] The invention relates to a device for strapping two or more packets with a band, which device substantially comprises a frame, a lying conveyor belt supported by the frame for moving forward the packets, a pair of band clamping and guiding jaws movable toward and away from each other transversely of the conveyor belt, a supply reel associated with a jaw and guide members for the strapping band in addition to welding means co-acting with the jaws for welding together the band portions supplied by the pair of jaws, wherein each jaw has a clamping surface which runs transversely relative to the direction of movement and which co-acts with a counter-surface of an intermediate body carried by one of the jaws, wherein the clamping and counter-surface extends obliquely relative to the direction of movement.

[0002] Such a device is for example known from DE-A-44 01 505. In this device the clamping elements in the apparatus are provided with guide rollers for guiding the band over the profile of the clamping surface without touching this profile, during the tensioning/pulling phase of the band. Both clamping surfaces have a step-like form, so that both surfaces fit tightly against each other and hold the band against sliding during the welding operation.

[0003] A device of the type described in the preamble has the advantage that in quite rapid manner loose packets can be combined into a larger packet by means of strapping with a band which is in fact composed of two parts, the one part end of which is connected to the other part end by a heat weld, and wherein the closing end is likewise realized by a heat weld, during which welding operation the band is held firmly round the packet. This latter requires a rather large tensile force in the band, which tensile force must be produced by the clamping force of the closing jaws, which in turn results in relatively great wear on the guide edges thereof. The known welding jaws moreover have the drawback that when they are retracted some play is released into the band, which causes a reduction in the tensioning force in the band and therefore makes holding together of the strapped packet less stable.

[0004] The invention has for its object to obviate the above stated drawbacks and provides for this purpose a device which is distinguished in that at least one of the surfaces is provided with tooth-like protrusions set obliquely relative to the pulling direction, to prevent slipping, in a way that hardly any elongation of the band loop round the packet is caused and so that the tension therein is hardly reduced after release of the band.

[0005] Owing to the oblique clamping surfaces proposed by the invention the play which must be applied for welding of the band is considerably reduced, so that after completion of the weld the band will spring back less, whereby the initial tensioning force in the band also maintained round the finished packet.

[0006] In addition, arranging of the oblique teeth on

one of the surfaces of the clamping jaws will give the advantage that the band is held more firmly and will not slip back, so that the braking members determining the tensioning force of the band in the device can be adjusted more tightly so that a higher tensioning force in the band can be obtained.

[0007] Above mentioned and other features of the invention will be further elucidated hereinbelow in the figure description of an embodiment. In the drawing:

fig. 1 shows a perspective schematic view of a strapping device according to the invention,
fig. 2 shows a perspective view with partly broken away parts of the mutually opposing clamping jaws just before closing thereof,
fig. 3, 4 and 5 shows perspective views corresponding with fig. 2 in the different operational positions of the clamping jaws,
fig. 6 is a perspective view on enlarged scale of the position as shown in fig. 5.

[0008] Designated in fig. 1 with the numeral 1 is a frame of the device which can be constructed in random manner. The frame is portal-like such that a conveyor 2 can be arranged under the portal for transporting packets P in the direction of arrow P1. The packets are combined into a series of packets around which a band B must be strapped. To this end the band can be unwound from a supply 3 and is guided to welding-clamping jaws 6 via a braking mechanism 4, which is assumed known in the professional field and requires no further explanation, and via reversing pulleys 5. It is stated for the sake of clarity that supply roll 3 with the band guide systems 4, 5 is likewise arranged on the other side of the device. Both ends of the band on the left-hand respectively right-hand side of conveyor 2 are welded to each other at 8, wherein clamping jaws 7 are moved toward each other behind the combined packet P by means of a cylinder 9. The band is herein nestled against the rear side P and held under tension by the braking means 4.

[0009] When the band B is held under tension, wear will occur on the guide edges due to the sliding movement along clamping jaws 7.

[0010] As will be apparent from the above, the band B1 on the left in fig. 2 and B2 on the right in fig. 2 runs from the supply on the main frame along the side surfaces of the two co-acting welding jaws, which are shown in detail in fig. 2.

[0011] The left-hand welding jaw 7 has a sleeve-like housing 10 which is mounted on the end of piston rod 11. Sleeve-like housing 10 has on the outside guide surfaces 12 for the band B1, wherein guide surface 12 initially extends axially but runs obliquely inward towards the end, see 12'. In sleeve-like part 10 is arranged a pair of pressure shoes 13 which can pivot in the horizontal plane relative to shaft 14. The operation thereof is further elucidated hereinbelow.

[0012] The right-hand welding jaw 7' is likewise pro-

vided with a sleeve-like housing 10, on the outside of which a guide surface 12' corresponding with 12 is arranged via inserts, over which surface the band B2 is guided.

[0013] Over a part of the periphery the sleeve-like housing 10 of welding jaw 7' takes a widened form at 15 toward the side of the co-acting welding jaw 7. The remaining part of the periphery is formed by a sleeve-like part 16 open at the top which is movable up and downward relative to housing part 10 of welding jaw 7' via a pivoting arm 17. On the inner side of this part 16 is arranged a rise cam 18 which co-acts with a cam 19 on the underside of the left-hand welding jaw 7.

[0014] Arranged on the inside of part 16 on a level with the height of the guide surfaces 12, 12' is a body 20 respectively 21 which is provided with counter-clamping surfaces 22.

[0015] Fig. 6 shows in detail that counter-clamping surface 22 is embodied with teeth 25 which protrude inward.

[0016] In housing part 10 of right-hand welding jaw 7' is arranged a welding head 30 which consists of a heatable body 31 around which is folded a welding strip 32. This latter has a protruding ridge 33 in the centre line part and extends outward therefrom as far as a hammer-shaped part 34 to form a welding shoe. Welding head 30 can be shifted forward in housing part 10 against clamping shoes 13, this being further elucidated below.

[0017] The above described operation of the welding heads is as follows. Starting from the position of fig. 2 the bands B1 and B2 are each guided individually round a guide surface 12, 12' and the opposite guide surface on the other side of the welding jaw. In this situation the annular part 16 is moved downward relative to the centre line of the mutually opposite cylinder rods 11 of the welding heads.

[0018] Due to the further movement of the welding heads toward each other the annular part 16 will initially move upward on pressure roller 19 by means of cam 18, wherein annular part 16 is pressed against the housing part 15 lying above, wherein the horizontal position of bodies 20 is ensured by the parallel guiding formed by arms 17.

[0019] The forward movement of the welding heads continues further until the surfaces 12' of guide strips 12 press against the counter-surfaces 22. This situation is shown in fig. 3. The bands are firmly clamped between the co-acting surfaces 12' and 22, wherein the inward protruding teeth 25 grip the bands firmly to prevent slippage resulting from the tensile force on the band in the direction of arrow P2, see also fig. 6.

[0020] By moving welding head 31 further to the left toward the pair of clamping bodies 13, the band portions will initially be situated at a mutual distance and reach no further than the transition between surface 22 and 20 of the counter-body in housing part 16.

[0021] By heating the welding head 31 the ridge 33 will be heated such that the band part situated in front

of it will be melted through.

[0022] As welding head 31 is moved further toward clamping bodies 13, the band will extend over the surface 20. The heated ridge 33 then reaches the opposite band portion between the surfaces 12' of the left-hand clamping head and will likewise melt this through.

[0023] When clamping bodies 13 are moved to the right this band portion is nestled over the band portion of the right-hand clamp already lying on surface 20, whereafter the already heated band portions are welded together by the hammer-like ends 34 of the welding shoe while the portions are being pressed by the outward spread clamping bodies 13, see fig. 5. In this manner the band portions are melted together on the left-hand and right-hand side of the clamping jaws, wherein it is assumed that the band facing toward the reader is situated on the rear of the packet P in fig. 1, and therefore forms the band loop, while the band facing away from the reader in fig. 4 is the new strapping band for the following packet on the conveyor. When the welding is completed and the clamping jaws retracted, the band is released and will straighten slightly as a result of the displacement of the band portion on surface 20 into the line of the stretched band. This displacement is indicated with "a" in fig. 6 but, owing to the inclining surfaces 12' and counter-surface 22 this causes hardly any elongation of the band loop round the packet and will hardly reduce the tension therein at all.

[0024] Wear of the welding or clamping heads 7 resulting from the higher allowed tension in the band is avoided due to the guide bodies 12, 12' embodied as inserts.

[0025] The invention is not limited to the above described embodiment.

Claims

1. Device for strapping two or more packets with a band, which device substantially comprises a frame, a lying conveyor belt supported by the frame for moving forward the packets, a pair of band clamping and guiding jaws movable toward and away from each other transversely of the conveyor belt, a supply reel associated with a jaw and guide members for the strapping band in addition to welding means co-acting with the jaws for welding together the band portions supplied by the pair of jaws, wherein each jaw has a clamping surface which runs transversely relative to the direction of movement and which co-acts with a counter-surface of an intermediate body carried by one of the jaws, wherein the clamping and counter-surface extends obliquely relative to the direction of movement, characterized in that at least one of the surfaces is provided with tooth-like protrusions set obliquely relative to the pulling direction to prevent slipping, in a way that hardly any elongation of the

band loop round the packet is caused and so that the tension therein is hardly reduced after release of the band.

2. Device as claimed in claim 1, **characterized in that** the clamping surface on each of the jaws is formed by the outer surface of an insert.
3. Device as claimed in claim 1 or 2, **characterized in that** the guiding edge of the insert extends beyond the associated clamping jaw.
4. Device as claimed in any of the foregoing claims, **characterized in that** the obliquely set tooth-like protrusions are arranged on the counter-surface.

Patentansprüche

1. Vorrichtung zur Umreifung von zwei oder mehreren Paketen mit einem Band, welche Vorrichtung im Wesentlichen die folgenden Teile umfasst: einen Rahmen, einen liegenden Förderriemen, der vom Rahmen getragen wird, um die Pakete nach vorn zu befördern, ein Paar von Bandklemm- und Führungsbacken, die quer zum Förderriemen aufeinander zu und voneinander weg bewegbar sind, eine Vorratsspule, die einem Backen- und Führungskörper für das Umreifungsband zusätzlich zu einer Schweißvorrichtung zugeordnet sind, die mit den Backen zusammenwirkt, um die Bandabschnitte, die durch das Backenpaar zugeführt wurden, zu verschweißen, wobei jede Backe eine Klemmoberfläche besitzt, die quer relativ zur Bewegungsrichtung verläuft und die mit einer Gegenfläche eines Zwischenkörpers zusammenwirkt, der von einer der Backen getragen wird, wobei die Klemm- und Gegenoberfläche sich schräg relativ zur Bewegungsrichtung erstreckt, **dadurch gekennzeichnet, dass** wenigstens eine der Oberflächen mit zahnartigen Vorsprüngen versehen ist, die schräg relativ zur Zugrichtung stehen, um ein Durchrutschen zu verhindern, wobei die Anordnung derart getroffen ist, dass kaum eine Verlängerung der Bandschleife um das Paket verursacht wird und derart, dass die Spannung darin kaum vermindert ist, nachdem das Band freigegeben wird.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Klemmfläche auf jeder Backe durch die äußere Oberfläche eines Einsatzes gebildet wird.
3. Vorrichtung nach den Ansprüchen 1 oder 2, **dadurch gekennzeichnet, dass** der Führungsrand des Einsatzes sich über die zugeordnete Klemmbacke erstreckt.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die schräg stehenden zahnartigen Vorsprünge auf der Gegenoberfläche angeordnet sind.

Revendications

1. Dispositif de cerclage de deux paquets ou plus par un ruban, lequel dispositif comprend globalement un bâti, une courroie transporteuse horizontale, soutenue par le bâti et servant à faire avancer les paquets, une paire de mors de serrage et de guidage de ruban, qui sont mobiles de manière à se rapprocher et à s'éloigner l'un de l'autre transversalement à la courroie transporteuse, une bobine débitrice, qui est associée à un mors et à des éléments de guidage pour le ruban de cerclage, en plus de moyens de soudage qui coopèrent avec les mors pour assembler par soudage les parties de ruban fournies par la paire de mors, dans lequel chaque mors présente une surface de serrage, qui s'étend transversalement par rapport au sens de déplacement et qui coopère avec une contre-surface d'un corps intermédiaire porté par l'un des mors, dans lequel la contre-surface de serrage s'étend obliquement par rapport au sens de déplacement, **caractérisé en ce qu'au moins l'une des surfaces est pourvue de saillies en forme de dents, disposées obliquement par rapport au sens de traction afin d'éviter le glissement, de manière à ce que la boucle formée par le ruban autour du paquet subisse à peine une elongation, et de telle sorte que la tension du ruban ne puisse guère être réduite après la libération du ruban.**
2. Dispositif selon la revendication 1, **caractérisé en ce que** la surface de serrage, présente sur chacun des mors, est constituée par la surface extérieure d'un élément rapporté.
3. Dispositif selon la revendication 1 ou 2, **caractérisé en ce que** le bord de guidage de l'élément rapporté s'étend au-delà du mors de serrage associé.
4. Dispositif selon l'une des revendications précédentes, **caractérisé en ce que** les saillies en forme de dents, situées obliquement, sont situées sur la contre-surface.







